

# PATENT COOPERATION TREATY

## PCT

REC'D 25 MAY 2005

### INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY PCT

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 18916	FOR FURTHER ACTION See Form PCT/PEA/416	
International application No. PCT/IB2004/002497	International filing date (day/month/year) 11.06.2004	Priority date (day/month/year) 13.06.2003
International Patent Classification (IPC) or national classification and IPC B32B27/34		
Applicant TECNO COATING ENGINEERING S.R.L.		
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 6 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> <i>(sent to the applicant and to the International Bureau)</i> a total of 21 sheets, as follows:</p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</li> <li><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</li> </ul> <p>b. <input type="checkbox"/> <i>(sent to the International Bureau only)</i> a total of (indicate type and number of electronic carrier(s)), containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>		
<p>4. This report contains indications relating to the following items:</p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Box No. I Basis of the opinion</li> <li><input type="checkbox"/> Box No. II Priority</li> <li><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</li> <li><input type="checkbox"/> Box No. IV Lack of unity of invention</li> <li><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</li> <li><input type="checkbox"/> Box No. VI Certain documents cited</li> <li><input type="checkbox"/> Box No. VII Certain defects in the international application</li> <li><input checked="" type="checkbox"/> Box No. VIII Certain observations on the international application</li> </ul>		
Date of submission of the demand 11.01.2005	Date of completion of this report 27.05.2005	
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**INTERNATIONAL PRELIMINARY REPORT  
ON PATENTABILITY**

International application No.  
PCT/IB2004/002497

**Box No. I Basis of the report**

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
  - This report is based on translations from the original language into the following language, which is the language of a translation furnished for the purposes of:
    - international search (under Rules 12.3 and 23.1(b))
    - publication of the international application (under Rule 12.4)
    - international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements\*** of the international application, this report is based on (*replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report*):

**Description, Pages**

1, 2, 5-11	as originally filed
3, 4	received on 11.01.2005 with letter of 05.01.2005

**Claims, Numbers**

1-26	received on 11.01.2005 with letter of 05.01.2005
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**Drawings, Sheets**

1/3-3/3	as originally filed
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a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3.  The amendments have resulted in the cancellation of:
  - the description, pages
  - the claims, Nos.
  - the drawings, sheets/figs
  - the sequence listing (*specify*):
  - any table(s) related to sequence listing (*specify*):
4.  This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
  - the description, pages
  - the claims, Nos.
  - the drawings, sheets/figs
  - the sequence listing (*specify*):
  - any table(s) related to sequence listing (*specify*):

\* If item 4 applies, some or all of these sheets may be marked "superseded."

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**Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

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**1. Statement**

Novelty (N)	Yes: Claims	3-26
	No: Claims	1,2
Inventive step (IS)	Yes: Claims	
	No: Claims	1-26
Industrial applicability (IA)	Yes: Claims	1-26
	No: Claims	

**2. Citations and explanations (Rule 70.7):**

**see separate sheet**

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**Box No. VIII Certain observations on the international application**

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The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

**see separate sheet**

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**Re Item V**

**Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

Reference is made to the following document:

D1: EP-A-0800915

**Novelty:**

Document D1 discloses (cf. figure 1; column 1, lines 5 - 24; column 4, lines 20 - 37; the claims; column 7, line 45 - column 11, line 20) a blown (and thus biaxially oriented) film which, by default, must intrinsically have at least some shrink properties comprising in sequence the following layers:

- layer 15: an outer nylon layer
- layer 13: an adhesive layer (eg. anhydride modified polyolefin)
- layer 11: a nylon layer (eg. nylon 6)
- layer 10: an inner EVOH layer
- layer 12: a nylon layer (eg. nylon 6)
- layer 14: an adhesive layer (eg. anhydride modified polyolefin)
- layer 16: an outer sealant layer (eg. LLDPE or LDPE or ionomer)

The layers are not crosslinked. The outer sealant layer melts at a lower temperature than the other layers. The three nylon layers have a higher Young's modulus than the other layers, whereas one of these layers is on the outside and the other layers are on the inside of the film. The three nylon layers are separated from each other by layers with lower Young modulus. Nylon layers are well-known to be "highly" impermeable to gases.

In view of the fact that the expression "in that said two layers with a higher Young's modulus which are situated inside the film are located on the opposite side, in relation to the neutral plane of the film, from the layer with a higher Young's modulus which lies on the outside of the film" is unclear (and, therefore, cannot be considered to limit the scope of claim 1), it appears that all features of independent claim 1 are disclosed in combination

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in D1, making the subject-matter of claim 1 not novel; Article 33(2) PCT. The subject-matter of dependent claim 2 does also not appear to be novel; Article 33(2) PCT.

The subject-matter of claims 3 - 26 differs from the subject-matter of D1 at least in that according to D1 an EVOH core layer is present, whereas according to the present application the corresponding layer D either:

- consists of a terionomer (i.e. in claims 7 - 12, 19 - 24)
- consists of LLDPE modified with maleic anhydride (i.e. claims 13 - 15, 25, 26)
- consists of an EVA/ethylene methacrylic acid copolymer (i.e. claims 16, 17, 27, 28, 29)
- consists of one of the above (claims 6, 18).

Hence, the subject-matter of claims 3 - 26 is novel in view of D1; Article 33(2) PCT.

***Inventive Step:***

The differences identified above, do not appear to lead to any technical effects. The problem underlying claims 3 - 26 can, therefore, only be regarded as to provide alternative shrink wrap films.

It would be obvious for the skilled person, starting from D1, to come up with all the alternative structures claimed in claims 3 - 26. Hence, no inventive step can be acknowledged for the subject-matter of these claims; Article 33(3) PCT.

***Industrial Applicability:***

The subject-matter of claims 1 - 26 is industrially applicable; Article 33(4) PCT.

**Re Item VIII**

**Certain observations on the international application**

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The present set of claims does not meet the requirements of Article 6 PCT for the following reasons:

- 1) As already noted above, the expression "in that said two layers with a higher Young's modulus which are situated inside the film are located on the opposite side, in relation to the neutral plane of the film, from the layer with a higher Young's modulus which lies on the outside of the film" in claim 1 is unclear. In particular, it is noted that it is not defined what is meant with the term "neutral plane". No layer is neutral in for instance Young's modulus, thickness or barrier properties.
- 2) Claims 1 and 2 define a shrink film only by reference to desirable properties. In fact all films having these properties are claims, whereas there is support in the sense of Article 6 PCT only for a very limited number of such films, namely the films as defined in claims 3 - 26. Claims 1 and 2 do not meet the support requirements of Article 6 PCT.

Furthermore it does not appear to be appropriate for reasons of clarity, to define the films by reference to these desired properties only. As demonstrated in claims 3 - 26, it is perfectly possible to define the films of the present invention in terms of product features, such as the nature of the materials of the various layers.

- 3) In the introduction paragraph on page 1 of the description it is noted that films of the invention always comprise two layers constituted by a polyamide. This is not defined in claim 1, which, therefore, lacks essential features.
- 4) Having regard to the objections under the headings "novelty" and "inventive step" under section V, it is noted that claims 3 - 26 at the moment do not appear to be linked by same or corresponding special technical features in the sense of Rule 13.2 PCT, meaning that no single general inventive concept in the sense of Rule 13.1 PCT can be distinguished. At the moment, it appears that the requirements of unity of invention are not met.

technique makes said polymers partly unmeltable, and in any event increases their melting point. Melting of the layers which come into contact with the heating plates during welding is consequently prevented by crosslinking them.

More recently, polyvinylidene chloride copolymer has been partly replaced by 5 another polymer with barrier properties, namely ethylene/vinyl alcohol copolymer (EVOH).

These shrink film structures usually comprise EVOH in the middle layer, sandwiched by polyolefins in the outer layers. Adherence between the various layers can be obtained with the use of special types of modified polyolefins, also 10 called "adhesives".

Mechanical strength and adherence between the layers can be improved by subjecting the film to irradiation with high-energy particles.

However, although the crosslinking technique solves the welding problem without causing curling and gives the film good mechanical strength, it also gives rise to a 15 serious problem, because it makes the polymers that constitute the film partly unmeltable, and this prevents them from being recycled.

An alternative technique to selective crosslinking, which would solve the welding problems and increase the mechanical strength of the film, would be to use high-strength polymers with a high melting point in the outer layer of the film.

20 However, in this case the two polymers, ie. the outer and inner ones, differ not only in terms of melting point but also of their modulus of elasticity and degree of crystallinity. As a result, differentiated tensions develop in the structure of the film and the film is pulled to one side, giving rise to the problem of curling already described.

25 A third problem is loss of transparency (haze) and gloss by the film after shrinking at the application stage. This problem, which adversely affects the final

European patent application EP 0 800 915 A2 discloses a multilayer film using high Young's modulus in the outer layer, but the stacking is not balanced, so the film curl.

appearance of the packaging, is mainly due to poor adherence between the layers, which shrink in different ways, and possibly to surface damage caused by the heat applied to obtain the shrinkage.

The above-mentioned problems involved in the prior art are solved by a plastic film

EP-A-1410902

5 conforming to patent application no. ~~MI2002A-002159~~ filed by the present applicant, namely a multilayer, non-crosslinked shrink film with gas barrier properties, characterised by:

- exceptional mechanical strength,
- easy welding and good welding resistance,
- 10 • optical characteristics superior to those of ordinary products on the market,
- little or no curling, despite its asymmetrical structure,
- good shrinkage characteristics,
- good adherence to the packaged contents,
- good oxygen and aqueous steam barrier properties.

15 All these characteristics have been obtained without the need to subject the film to ionising radiation treatment, but using a polymer with high mechanical strength and a high Young's modulus, which melts at a high temperature, in the outer layer.

In order to eliminate the problem of curling, other layers constituted by polymers with a high Young's modulus are inserted in a suitable position inside the laminate;

20 said layers act in such a way as to balance the effect of the outer layer, thus greatly reducing curling, and even eliminating it entirely in some compositions.

However, experiments conducted with numerous compositions demonstrate that these results tend to be somewhat unpredictable. This problem arises when the number of layers with a high modulus is greater than two and, in accordance with  
25 said patent application, two or more of said layers are situated inside the laminate on the side of the neutral layer, opposite the side on which the external layer with

## CLAIMS

## 1. Shrink film for wrapping foodstuffs, comprising:

- a plurality of overlaid layers constituted by non-crosslinked thermoplastic polymers of different natures, wherein the material that constitutes one of the outer layers melts at a lower temperature than the materials that constitute the other layers;
- three layers constituted by polymers having a Young's modulus substantially higher than that of the polymers which constitute the other layers;

in which:

~~characterised in that:~~

- one of said three layers with a higher Young's modulus is ~~on the outside~~ <sup>one of the two outer</sup> of the film, whereas the other two layers with a higher Young's modulus <sup>inner layers</sup> are ~~on the inside~~ of the film;
- each of said three layers with a higher Young's modulus is separated from the other layers with a higher Young's modulus by at least one layer with a lower Young's modulus;

~~2. Film as claimed in claim 1, characterised in that~~ said three layers with a higher Young's modulus are highly impermeable to gases, especially oxygen and aqueous steam,

~~3. Film as claimed in claim 1, characterised in that~~ said two layers with a higher Young's modulus which are situated inside the film are located on the opposite side, in relation to the neutral plane of the film, from the layer with a higher Young's modulus which lies on the outside of the film.

~~2~~ 4. Film as claimed in claim <sup>1</sup> ~~3~~, characterised in that the sequence of all the layers constituting said film, and their thickness, from which the distance of each of said layers from the neutral plane of said film derives, are determined in such

a way that the sum of the moments exerted by said layers in relation to said neutral plane after the process of biaxial orientation is substantially nil, wherein:

- the moment exerted by a single layer in relation to the neutral plane is equal to the product of the membrane force exerted by said layer and the distance of the average plane of said layer from the neutral plane of the film;
- the membrane force exerted by said layer is equal to the product of the Young's modulus of the material which constitutes said layer, the thickness of said layer and the prevented shrinkage, expressed as a percentage.

5 5. ~~Film as claimed in claims 1 to 3, characterised in that the layers with a higher Young's modulus are constituted by polymers of the polyamide family.~~

10 3 -6: Film as claimed in claims 1 to ~~5~~<sup>2</sup>, characterised in that it comprises seven layers (A, B, C, D, E, F and G), starting from the layer in contact with the product, composed as follows:

- layer A, thickness 10 to 30%, welding layer – constitutes the internal part of the wrapping, and can be constituted by ionomers containing zinc or sodium, a low-density polyethylene or linear low-density polyethylene (LDPE/LLDPE), or an ethylene or octene plastomer;
- layer B, thickness 5 to 15%, first adhesive layer – consists of an adhesive polymer selected from among terionomers, or ethylene modified with maleic anhydride copolymers, or an EVA/ethylene methacrylic acid copolymer;
- layer C, thickness 10 to 20%, first barrier layer (mainly to aqueous steam) – consists of a polyamide polymer selected from among PA 6, PA 6/66,

amorphous or aliphatic PA or a mixture thereof, possibly with the addition of terionomers;

- layer D, thickness 10 to 20%, second adhesive layer – consists of an adhesive polymer selected from among terionomers, or ethylene modified with maleic anhydride copolymers, or of an EVA/ethylene methacrylic acid copolymer, and may be equal to or different from layer B;
- layer E, thickness 10 to 20%, second barrier layer (mainly to aqueous steam) – consists of a polyamide polymer selected from among PA 6, PA 6/66, amorphous or aliphatic PA or a mixture thereof, possibly with the addition of terionomers, and may be equal to or different from layer C, alternatively, PVA or PGA can be used;
- layer F, thickness 5 to 15%, third adhesive layer – consists of an adhesive polymer selected from among terionomers, or ethylene modified with maleic anhydride copolymers, or of an EVA/ethylene methacrylic acid copolymer, and may be equal to or different from layers B and D;
- layer G, thickness 5 to 25%, outer layer and fourth barrier layer (mainly to aqueous steam) – consists of a polyamide polymer selected from among PA 6 or PA 6/66.

4. <sup>3</sup> Film as claimed in claim ~~6~~, characterised in that it ~~comprises seven layers (A, B, C, D, E, F and G), starting from the layer in contact with the product, composed as follows:~~

<sup>Said</sup>

- <sup>✓</sup> layer A, thickness 10 to 30%, welding layer – constitutes the inner part of the wrapping, and is constituted by ionomers containing zinc or sodium;
- <sup>Said</sup> <sup>✓</sup> layer B, thickness 5 to 10%, first adhesive layer – consists of a terionomer;
- <sup>Said</sup> <sup>✓</sup> layer C, thickness 10 to 20%, first barrier layer (mainly to aqueous steam)

— consists of a polyamide polymer selected from among polyamides PA 6/66;

*said*

- $\gamma$  layer D, thickness 10 to 20%, second adhesive layer — consists of an adhesive polymer selected from among the terionomers;

5 *said*

- $\gamma$  layer E, thickness 10 to 20%, second barrier layer (mainly to aqueous steam) — consists of a polyamide polymer PA 6/66;

*said*

- $\gamma$  layer F, thickness 5 to 15%, third adhesive layer — consists of an adhesive polymer selected from among the terionomers;

10 *said*

- $\gamma$  layer G, thickness 5 to 25%, outer layer and third barrier layer (mainly to aqueous steam) — consists of a polyamide polymer PA 6/66.

5 5 ~~—~~ <sup>3</sup> Film as claimed in claim ~~6~~, characterised in that it ~~comprises seven layers (A, B, C, D, E, F and G)~~, starting from the layer in contact with the product, ~~composed as follows:~~

15 *said*

- $\gamma$  layer A, thickness 10 to 30%, welding layer — constitutes the inner part of the wrapping, and is constituted by ionomers containing zinc or sodium;

*said*

- $\gamma$  layer B, thickness 5 to 15%, first adhesive layer — consists of a terionomer;

20 *said*

- $\gamma$  layer C, thickness 10 to 20%, first barrier layer (mainly to aqueous steam) — consists of a mixture of polyamides PA 6/66 and aliphatic PA;

*said*

- $\gamma$  layer D, thickness 10 to 20%, second adhesive layer — consists of an adhesive polymer selected from among the terionomers;

*said*

- $\gamma$  layer E, thickness 10 to 20%, second barrier layer (mainly to aqueous steam) — consists of a polyamide polymer PA 6/66;

25 *said*

- $\gamma$  layer F, thickness 5 to 15%, third adhesive layer — consists of an adhesive polymer selected from among the terionomers;

*said*

- $\gamma$  layer G, thickness 5 to 25%, outer layer and third barrier layer (mainly to

aqueous steam) – consists of a polyamide polymer PA 6/66.

6-9. Film as claimed in claim 6, characterised in that it comprises seven layers (A, B, C, D, E, F and G), starting from the layer in contact with the product, composed as follows:

*said*

5 •  $\gamma$  layer A, thickness 10 to 30%, welding layer – constitutes the inner part of

the wrapping, and is constituted by ionomers containing zinc or sodium;

*said* •  $\gamma$  layer B, thickness 5 to 15%, first adhesive layer – consists of a terionomer;

*said* •  $\gamma$  layer C, thickness 10 to 20%, first barrier layer (mainly to aqueous steam)

10 – consists of a mixture of polyamides PA 6/66 + amorphous PA blended with a terionomer;

*said* •  $\gamma$  layer D, thickness 10 to 20%, second adhesive layer – consists of an adhesive polymer selected from among the terionomers;

*said* •  $\gamma$  layer E, thickness 10 to 20%, second barrier layer (mainly to aqueous

15 steam) – consists of a polyamide polymer PA 6/66;

*said* •  $\gamma$  layer F, thickness 5 to 15%, third adhesive layer – consists of an adhesive polymer selected from among the terionomers;

*said* •  $\gamma$  layer G, thickness 5 to 25%, outer layer and third barrier layer (mainly to aqueous steam) – consists of a polyamide polymer PA 6/66.

20 7-10. Film as claimed in claim 6, characterised in that it comprises seven layers (A, B, C, D, E, F and G), starting from the layer in contact with the product,

composed as follows:

*said*

•  $\gamma$  layer A, thickness 10 to 30%, welding layer – constitutes the inner part of

the wrapping, and is constituted by ionomers containing zinc or sodium;

25 •  $\gamma$  layer B, thickness 5 to 15%, first adhesive layer – consists of a terionomer;

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said

- $\gamma$  layer C, thickness 10 to 20%, first barrier layer (mainly to aqueous steam)
  - consists of a polyamide polymer selected from among polyamides PA 6/66;

said

- $\gamma$  layer D, thickness 10 to 20%, second adhesive layer – consists of an adhesive polymer selected from among the terionomers;

said

- $\gamma$  layer E, thickness 10 to 20%, second barrier layer (mainly to aqueous steam) – consists of a mixture of polyamides PA 6/66 + amorphous PA;

said

- $\gamma$  layer F, thickness 5 to 15%, third adhesive layer – consists of an adhesive polymer selected from among the terionomers;

said

- $\gamma$  layer G, thickness 5 to 25%, outer layer and third barrier layer (mainly to aqueous steam) – consists of a polyamide polymer PA 6/66.

**3 44.** Film as claimed in claim ~~3~~<sup>3</sup>, characterised in that ~~it comprises seven layers (A, B, C, D, E, F and G), starting from the layer in contact with the product, composed as follows:~~

said

- $\gamma$  layer A, thickness 10 to 30%, welding layer – constitutes the inner part of the wrapping, and is constituted by ionomers containing zinc or sodium;

said

- $\gamma$  layer B, thickness 5 to 15%, first adhesive layer – consists of a terionomer;

said

- $\gamma$  layer C, thickness 10 to 20%, first barrier layer (mainly to aqueous steam)
  - consists of a polyamide polymer selected from among polyamides PA 6/66;

20

said

- $\gamma$  layer D, thickness 10 to 20%, second adhesive layer – consists of an adhesive polymer selected from among the terionomers;

said

- $\gamma$  layer E, thickness 10 to 20%, second barrier layer (mainly to aqueous steam) – consists of a mixture of polyamides PA 6/66 + amorphous PA blended with a terionomer;

*said*

- $\gamma$  layer F, thickness 5 to 15%, third adhesive layer – consists of an adhesive polymer selected from among the terionomers;

*said*

- $\gamma$  layer G, thickness 5 to 25%, outer layer and third barrier layer (mainly to aqueous steam) – consists of a polyamide polymer PA 6/66.

5 9 42. Film as claimed in claim  $\frac{3}{3}$ , characterised in that it ~~comprises seven layers (A, B, C, D, E, F and G)~~, starting from the layer in contact with the product, composed as follows:

*said*

- $\gamma$  layer A, thickness 10 to 30%, welding layer – constitutes the inner part of the wrapping, and is constituted by ionomers containing zinc or sodium;

10 ~~said~~ •  $\gamma$  layer B, thickness 5 to 15%, first adhesive layer – consists of a terionomer;

*said*

- $\gamma$  layer C, thickness 10 to 20%, first barrier layer (mainly to aqueous steam) – consists of a polyamide polymer selected from among polyamides PA

6/66;

*said*

15 •  $\gamma$  layer D, thickness 10 to 20%, second adhesive layer – consists of an adhesive polymer selected from among the terionomers;

*said*

- $\gamma$  layer E, thickness 10 to 20%, second barrier layer (mainly to aqueous steam) – consists of an aliphatic PA polymer;

*said*

20 •  $\gamma$  layer F, thickness 5 to 15%, third adhesive layer – consists of an adhesive polymer selected from among the terionomers;

*said*

- $\gamma$  layer G, thickness 5 to 25%, outer layer and third barrier layer (mainly to aqueous steam) – consists of a polyamide polymer PA 6/66.

10 15. Film as claimed in claim  $\frac{3}{3}$ , characterised in that it ~~comprises seven layers (A, B, C, D, E, F and G)~~, starting from the layer in contact with the product,

25 composed as follows:

*said*

- $\gamma$  layer A, thickness 10 to 30%, welding layer – constitutes the inner part of

the wrapping, and is constituted by an ethylene or octene plastomer

said

- $\gamma$  layer B, thickness 5 to 15%, first adhesive layer – consists of LLDPE

modified with maleic anhydride;

said

- $\gamma$  layer C, thickness 10 to 20%, first barrier layer (mainly to aqueous steam)

5

– consists of a mixture of polyamides PA 6/66 + amorphous PA;

said

- $\gamma$  layer D, thickness 10 to 20%, second adhesive layer – consists of LLDPE

modified with maleic anhydride;

said

- $\gamma$  layer E, thickness 10 to 20%, second barrier layer (mainly to aqueous

steam) – consists of a polyamide polymer PA 6/66;

said

- $\gamma$  layer F, thickness 5 to 15%, third adhesive layer – consists of LLDPE

modified with maleic anhydride;

said

- $\gamma$  layer G, thickness 5 to 25%, outer layer and third barrier layer (mainly to aqueous steam) – consists of a polyamide polymer PA 6/66.

10

11 44. Film as claimed in claim 6, characterised in that it comprises seven layers (A,

15 B, C, D, E, F and G), starting from the layer in contact with the product, composed as follows:

said

- $\gamma$  layer A, thickness 10 to 30%, welding layer – constitutes the inner part of the wrapping, and is constituted by LLDPE;

said

- $\gamma$  layer B, thickness 5 to 15%, first adhesive layer – consists of LLDPE

20

modified with maleic anhydride;

said

- $\gamma$  layer C, thickness 10 to 20%, first barrier layer (mainly to aqueous steam)

– consists of a mixture of polyamides PA 6/66 + amorphous PA;

said

- $\gamma$  layer D, thickness 10 to 20%, second adhesive layer – consists of LLDPE

modified with maleic anhydride;

said

- $\gamma$  layer E, thickness 10 to 20%, second barrier layer (mainly to aqueous steam) – consists of a polyamide polymer PA 6/66;

25

said

- $\gamma$  layer F, thickness 5 to 15%, third adhesive layer – consists of LLDPE modified with maleic anhydride;

said

- $\gamma$  layer G, thickness 5 to 25%, outer layer and third barrier layer (mainly to aqueous steam) – consists of a polyamide polymer PA 6/66.

5 12 45. Film as claimed in claim  $\frac{3}{6}$ , characterised in that ~~it comprises seven layers (A, B, C, D, E, F and G), starting from the layer in contact with the product, composed as follows:~~

said

- $\gamma$  layer A, thickness 10 to 30%, welding layer – constitutes the inner part of the wrapping, and is constituted by LDPE;

10 said •  $\gamma$  layer B, thickness 5 to 15%, first adhesive layer – consists of an EVA/ethylene methacrylic acid copolymer;

said

- $\gamma$  layer C, thickness 10 to 20%, first barrier layer (mainly to aqueous steam) – consists of a mixture of polyamides PA 6/66 + PA 6;

said

- $\gamma$  layer D, thickness 10 to 20%, second adhesive layer – consists of an EVA/ethylene methacrylic acid copolymer;

said

- $\gamma$  layer E, thickness 10 to 20%, second barrier layer (mainly to aqueous steam) – consists of a polyamide polymer PA 6/66;

said

- $\gamma$  layer F, thickness 5 to 15%, third adhesive layer – consists of an EVA/ethylene methacrylic acid copolymer;

20 said •  $\gamma$  layer G, thickness 5 to 25%, outer layer and third barrier layer (mainly to aqueous steam) – consists of a polyamide polymer PA 6/66.

13 46. Film as claimed in claim  $\frac{6}{6}$ , characterised in that ~~it comprises seven layers (A, B, C, D, E, F and G), starting from the layer in contact with the product, composed as follows:~~

25 said •  $\gamma$  layer A, thickness 10 to 30%, welding layer – constitutes the inner part of the wrapping, and is constituted by ionomers containing zinc or sodium;

*said*

- $\Upsilon$  layer B, thickness 5 to 15%, first adhesive layer – consists of a terionomer;
- said*
- $\Upsilon$  layer C, thickness 10 to 20%, first barrier layer (mainly to aqueous steam)
  - consists of a polyamide polymer selected from among polyamides PA 6/66;

5

*said*

- $\Upsilon$  layer D, thickness 10 to 20%, second adhesive layer – consists of an EVA/ethylene methacrylic acid copolymer;

*said*

- $\Upsilon$  layer E, thickness 10 to 20%, second barrier layer (mainly to aqueous steam) – consists of PVA (polyvinyl alcohol);

10

*said*

- $\Upsilon$  layer F, thickness 5 to 15%, third adhesive layer – consists of an EVA/ethylene methacrylic acid copolymer;

*said*

- $\Upsilon$  layer G, thickness 5 to 25%, outer layer and third barrier layer (mainly to aqueous steam) – consists of a polyamide polymer PA 6/66.

14 47. Film as claimed in claim  $\frac{3}{2}$ , characterised in that it comprises seven layers (A,15 B, C, D, E, F and G), starting from the layer in contact with the product,composed as follows:*said*

- $\Upsilon$  layer A, thickness 10 to 30%, welding layer – constitutes the inner part of the wrapping, and is constituted by ionomers containing zinc or sodium;

*said*

- $\Upsilon$  layer B, thickness 5 to 15%, first adhesive layer – consists of a terionomer;

*said*

- $\Upsilon$  layer C, thickness 10 to 20%, first barrier layer (mainly to aqueous steam)
  - consists of a polyamide polymer selected from among polyamides PA 6/66;

*said*

- $\Upsilon$  layer D, thickness 10 to 20%, second adhesive layer – consists of an EVA/ethylene methacrylic acid copolymer;

*said*

- $\Upsilon$  layer E, thickness 10 to 20%, second barrier layer (mainly to aqueous

steam) – consists of PGA (polyglycolic acid);  
*said*

- $\Upsilon$  layer F, thickness 5 to 15%, third adhesive layer – consists of an EVA/ethylene methacrylic acid copolymer;
- $\Upsilon$  layer G, thickness 5 to 25%, outer layer and third barrier layer (mainly to aqueous steam) – consists of a polyamide polymer PA 6/66.

15 48. Film as claimed in claim 6, characterised in that it comprises seven layers (A, B, C, D, E, F and G), starting from the layer in contact with the product, composed as follows:

*said*

- $\Upsilon$  layer A, thickness 20%, welding layer – constitutes the inner part of the wrapping, and can be constituted by ionomers containing zinc or sodium, a low-density polyethylene or linear low-density polyethylene (LDPE/LLDPE), or an ethylene or octene plastomer;
- $\Upsilon$  layer B, thickness 10%, first adhesive layer – consists of an adhesive polymer selected from among ethylene copolymers or terionomers modified with maleic anhydride, or of an EVA/ethylene methacrylic acid copolymer;
- $\Upsilon$  layer C, thickness 15%, first barrier layer (mainly to aqueous steam) – consists of a polyamide polymer selected from among PA 6, PA 6/66, amorphous or aliphatic PA or a mixture thereof, possibly with the addition of terionomers;
- $\Upsilon$  layer D, thickness 15%, second adhesive layer – consists of an adhesive polymer selected from among terionomers, or ethylene modified with maleic anhydride copolymers, or of an EVA/ethylene methacrylic acid copolymer, and may be equal to or different from layer B;
- $\Upsilon$  layer E, thickness 15%, second barrier layer (mainly to aqueous steam) – consists of a polyamide polymer selected from among PA 6, PA 6/66,

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amorphous or aliphatic PA or a mixture thereof, possibly with the addition of terionomers, and may be equal to or different from layer C; alternatively, PVA (polyvinyl alcohol) or PGA (polyglycolic acid) can be used;

5      *said*      •  $\checkmark$  layer F, thickness 10%, third adhesive layer – consists of an adhesive polymer selected from among terionomers, or ethylene modified with maleic anhydride copolymers, or of an EVA/ethylene methacrylic acid copolymer, and may be equal to or different from layers B and D;

10     *said*      •  $\checkmark$  layer G, thickness 15%, outer layer and fourth barrier layer (mainly to aqueous steam) – consists of a polyamide polymer selected from among PA 6 and PA 6/66.

16 ~~49~~. Film as claimed in claim <sup>3</sup> ~~8~~, characterised in that ~~it comprises seven layers (A, B, C, D, E, F and G), starting from the layer in contact with the product, composed as follows:~~

15     *said*      •  $\checkmark$  layer A, thickness 20%, welding layer – constitutes the inner part of the wrapping, and is constituted by ionomers containing zinc or sodium;

20     *said*      •  $\checkmark$  layer B, thickness 10%, first adhesive layer – consists of a terionomer;

25     *said*      •  $\checkmark$  layer C, thickness 15%, first barrier layer (mainly to aqueous steam) – consists of a polyamide polymer selected from among polyamides PA 6/66;

*said*      •  $\checkmark$  layer D, thickness 15%, second adhesive layer – consists of an adhesive polymer selected from among the terionomers;

*said*      •  $\checkmark$  layer E, thickness 15%, second barrier layer (mainly to aqueous steam) – consists of a polyamide polymer PA 6/66;

*said*      •  $\checkmark$  layer F, thickness 10%, third adhesive layer – consists of an adhesive polymer selected from among the terionomers;

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said

- $\Upsilon$  layer G, thickness 15%, outer layer and third barrier layer (mainly to aqueous steam) – consists of a polyamide polymer PA 6/66.

17 20. Film as claimed in claim 6, characterised in that it comprises seven layers (A, B, C, D, E, F and G), starting from the layer in contact with the product, composed as follows:

said

- $\Upsilon$  layer A, thickness 20%, welding layer – constitutes the inner part of the wrapping, and is constituted by ionomers containing zinc or sodium;

said

- $\Upsilon$  layer B, thickness 10%, first adhesive layer – consists of a terionomer;

said

- $\Upsilon$  layer C, thickness 15%, first barrier layer (mainly to aqueous steam) – consists of a mixture of polyamides PA 6/66 + aliphatic PA;

said

- $\Upsilon$  layer D, thickness 15%, second adhesive layer – consists of an adhesive polymer selected from among the terionomers;

said

- $\Upsilon$  layer E, thickness 15%, second barrier layer (mainly to aqueous steam) – consists of a polyamide polymer PA 6/66;

said

- $\Upsilon$  layer F, thickness 10%, third adhesive layer – consists of an adhesive polymer selected from among the terionomers;

said

- $\Upsilon$  layer G, thickness 15%, outer layer and third barrier layer (mainly to aqueous steam) – consists of a polyamide polymer PA 6/66.

18 21. Film as claimed in claim 6, characterised in that it comprises seven layers (A, B, C, D, E, F and G), starting from the layer in contact with the product, composed as follows:

said

- $\Upsilon$  layer A, thickness 20%, welding layer – constitutes the inner part of the wrapping, and is constituted by ionomers containing zinc or sodium;

said

- $\Upsilon$  layer B, thickness 10%, first adhesive layer – consists of a terionomer;

said

- $\Upsilon$  layer C, thickness 15%, first barrier layer (mainly to aqueous steam) – consists of a mixture of polyamides PA 6/66 + amorphous PA blended

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with a terionomer;

Said

- $\Upsilon$  layer D, thickness 15%, second adhesive layer – consists of an adhesive polymer selected from among the terionomers;

Said

- $\Upsilon$  layer E, thickness 15%, second barrier layer (mainly to aqueous steam) –

5

consists of a polyamide polymer PA 6/66;

Said

- $\Upsilon$  layer F, thickness 10%, third adhesive layer – consists of an adhesive polymer selected from among the terionomers;

Said

- $\Upsilon$  layer G, thickness 15%, outer layer and third barrier layer (mainly to aqueous steam) – consists of a polyamide polymer PA 6/66.

10 <sup>19</sup> ~~22~~ Film as claimed in claim <sup>3</sup> ~~6~~, characterised in that ~~it comprises seven layers (A, B, C, D, E, F and G), starting from the layer in contact with the product, composed as follows:~~

Said

- $\Upsilon$  layer A, thickness 20%, welding layer – constitutes the inner part of the wrapping, and is constituted by ionomers containing zinc or sodium;

Said

- $\Upsilon$  layer B, thickness 10%, first adhesive layer – consists of a terionomer;

Said

- $\Upsilon$  layer C, thickness 15%, first barrier layer (mainly to aqueous steam) –

consists of a polyamide polymer selected from among polyamides PA

6/66;

Said

- $\Upsilon$  layer D, thickness 15%, second adhesive layer – consists of an adhesive polymer selected from among the terionomers;

Said

- $\Upsilon$  layer E, thickness 15%, second barrier layer (mainly to aqueous steam) –

consists of a mixture of polyamides PA 6/66 + amorphous PA;

Said

- $\Upsilon$  layer F, thickness 10%, third adhesive layer – consists of an adhesive polymer selected from among the terionomers;

Said

- $\Upsilon$  layer G, thickness 15%, outer layer and third barrier layer (mainly to aqueous steam) – consists of a polyamide polymer PA 6/66.

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20-23. Film as claimed in claim <sup>3</sup> 6, characterised in that it comprises seven layers (A, B, C, D, E, F and G), starting from the layer in contact with the product, composed as follows:

said

•  $\Upsilon$  layer A, thickness 20%, welding layer – constitutes the inner part of the 5 wrapping, and is constituted by ionomers containing zinc or sodium;

said

•  $\Upsilon$  layer B, thickness 10%, first adhesive layer – consists of a terionomer;

said

•  $\Upsilon$  layer C, thickness 15%, first barrier layer (mainly to aqueous steam) – consists of a polyamide polymer selected from among polyamides PA

6/66;

10

said •  $\Upsilon$  layer D, thickness 15%, second adhesive layer – consists of an adhesive polymer selected from among the terionomers;

said

•  $\Upsilon$  layer E, thickness 15%, second barrier layer (mainly to aqueous steam) – consists of a mixture of polyamides PA 6/66 + amorphous PA blended with a terionomer;

15

said •  $\Upsilon$  layer F, thickness 10%, third adhesive layer – consists of an adhesive polymer selected from among the terionomers;

said

•  $\Upsilon$  layer G, thickness 15%, outer layer and third barrier layer (mainly to aqueous steam) – consists of a polyamide polymer PA 6/66.

21-24. Film as claimed in claim <sup>3</sup> 6, characterised in that it comprises seven layers (A, B, C, D, E, F and G), starting from the layer in contact with the product, composed as follows:

said

•  $\Upsilon$  layer A, thickness 20%, welding layer – constitutes the inner part of the 20 wrapping, and is constituted by ionomers containing zinc or sodium;

said

•  $\Upsilon$  layer B, thickness 10%, first adhesive layer – consists of a terionomer;

said

•  $\Upsilon$  layer C, thickness 15%, first barrier layer (mainly to aqueous steam) – 25 consists of a polyamide polymer selected from among polyamides PA

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6/66;

*Said*

- $\gamma$  layer D, thickness 15%, second adhesive layer – consists of an adhesive polymer selected from among the terionomers;

*Said*

- $\gamma$  layer E, thickness 15%, second barrier layer (mainly to aqueous steam) – consists of an aliphatic PA polymer;

5

*Said*

- $\gamma$  layer F, thickness 10%, third adhesive layer – consists of an adhesive polymer selected from among the terionomers;

*Said*

- $\gamma$  layer G, thickness 15%, outer layer and third barrier layer (mainly to aqueous steam) – consists of a polyamide polymer PA 6/66.

22 10 25. Film as claimed in claim 6, characterised in that ~~it comprises seven layers (A, B, C, D, E, F and G), starting from the layer in contact with the product, composed as follows:~~

*Said*

- $\gamma$  layer A, thickness 20%, welding layer – constitutes the inner part of the wrapping, and is constituted by an ethylene or octene plastomer;

15

*Said*

- $\gamma$  layer B, thickness 10%, first adhesive layer – consists of LLDPE modified with maleic anhydride;

*Said*

- $\gamma$  layer C, thickness 15%, first barrier layer (mainly to aqueous steam) – consists of a mixture of polyamides PA 6/66 + amorphous PA;

20

*Said*

- $\gamma$  layer D, thickness 15%, second adhesive layer – consists of LLDPE modified with maleic anhydride;

*Said*

- $\gamma$  layer E, thickness 15%, second barrier layer (mainly to aqueous steam) – consists of a polyamide polymer PA 6/66;

*Said*

- $\gamma$  layer F, thickness 10%, third adhesive layer – consists of LLDPE modified with maleic anhydride;

25

*Said*

- $\gamma$  layer G, thickness 15%, outer layer and third barrier layer (mainly to aqueous steam) – consists of a polyamide polymer PA 6/66.

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23 26. Film as claimed in claim 3, characterised in that it comprises seven layers (A, B, C, D, E, F and G), starting from the layer in contact with the product, composed as follows:

*said*

- $\checkmark$  layer A, thickness 20%, welding layer – constitutes the inner part of the wrapping, and is constituted by LLDPE;

*said*

- $\checkmark$  layer B, thickness 10%, first adhesive layer – consists of LLDPE modified with maleic anhydride;

*said*

- $\checkmark$  layer C, thickness 15%, first barrier layer (mainly to aqueous steam) – consists of a mixture of polyamides PA 6/66 + amorphous PA;

*said*

- $\checkmark$  layer D, thickness 15%, second adhesive layer – consists of LLDPE modified with maleic anhydride;

*said*

- $\checkmark$  layer E, thickness 15%, second barrier layer (mainly to aqueous steam) – consists of a polyamide polymer PA 6/66;

*said*

- $\checkmark$  layer F, thickness 10%, third adhesive layer – consists of LLDPE modified with maleic anhydride;

*said*

- $\checkmark$  layer G, thickness 15%, outer layer and third barrier layer (mainly to aqueous steam) – consists of a polyamide polymer PA 6/66.

24 27. Film as claimed in claim 3, characterised in that it comprises seven layers (A, B, C, D, E, F and G), starting from the layer in contact with the product, composed as follows:

*said*

- $\checkmark$  layer A, thickness 20%, welding layer – constitutes the inner part of the wrapping, and is constituted by LDPE;

*said*

- $\checkmark$  layer B, thickness 10%, first adhesive layer – consists of an EVA/ethylene methacrylic acid copolymer;

*said*

- $\checkmark$  layer C, thickness 15%, first barrier layer (mainly to aqueous steam) – consists of a mixture of polyamides PA 6/66 + PA 6;

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said

- $\Upsilon$  layer D, thickness 15%, second adhesive layer – consists of an EVA/ethylene methacrylic acid copolymer;

said

- $\Upsilon$  layer E, thickness 15%, second barrier layer (mainly to aqueous steam) – consists of a polyamide polymer PA 6/66;

said

5

- $\Upsilon$  layer F, thickness 10%, third adhesive layer – consists of an EVA/ethylene methacrylic acid copolymer;

said

- $\Upsilon$  layer G, thickness 15%, outer layer and third barrier layer (mainly to aqueous steam) – consists of a polyamide polymer PA 6/66.

25 26. Film as claimed in claim  $\frac{3}{6}$ , characterised in that ~~it comprises seven layers (A, B, C, D, E, F and G), starting from the layer in contact with the product, composed as follows:~~

said

- $\Upsilon$  layer A, thickness 20%, welding layer – constitutes the inner part of the wrapping, and is constituted by ionomers containing zinc or sodium;

said

- $\Upsilon$  layer B, thickness 10%, first adhesive layer – consists of a terionomer;

15 said

- $\Upsilon$  layer C, thickness 15%, first barrier layer (mainly to aqueous steam) – consists of a polyamide polymer selected from among polyamides PA 6/66;

said

- $\Upsilon$  layer D, thickness 15%, second adhesive layer – consists of an EVA/ethylene methacrylic acid copolymer;

said

20

- $\Upsilon$  layer E, thickness 15%, second barrier layer (mainly to aqueous steam) – consists of PVA (polyvinyl alcohol);

said

- $\Upsilon$  layer F, thickness 10%, third adhesive layer – consists of an EVA/ethylene methacrylic acid copolymer;

said

- $\Upsilon$  layer G, thickness 15%, outer layer and third barrier layer (mainly to aqueous steam) – consists of a polyamide polymer PA 6/66.

25 26. Film as claimed in claim  $\frac{3}{6}$ , characterised in that ~~it comprises seven layers (A,~~

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~~B, C, D, E, F and G~~), starting from the layer in contact with the product, composed as follows:

~~said~~

• ~~Y~~ layer A, thickness 20%, welding layer – constitutes the inner part of the wrapping, and is constituted by ionomers containing zinc or sodium;

~~said~~

5 • ~~Y~~ layer B, thickness 10%, first adhesive layer – consists of a terionomer;

~~said~~

• ~~Y~~ layer C, thickness 15%, first barrier layer (mainly to aqueous steam) – consists of a polyamide polymer selected from among polyamides PA

6/66;

~~said~~

10 • ~~Y~~ layer D, thickness 15%, second adhesive layer – consists of an EVA/ethylene methacrylic acid copolymer;

~~said~~

• ~~Y~~ layer E, thickness 15%, second barrier layer (mainly to aqueous steam) – consists of PGA (polyglycolic acid);

~~said~~

• ~~Y~~ layer F, thickness 10%, third adhesive layer – consists of an EVA/ethylene methacrylic acid copolymer;

~~said~~

15 • ~~Y~~ layer G, thickness 15%, outer layer and third barrier layer (mainly to aqueous steam) – consists of a polyamide polymer PA 6/66.